IOE Entrance Mock Test Question

Set IV

1. The dimensional formula of elastic constant is
   [1 Marks]
   a) ML^2T^{-3}

   b) $ML^{-1}T^1$

   c) $ML^{-1}T^{-2}$

   d) M^0LT^{-2}

2. A particle executing SHM of amplitude 5cm has maximum speed of 31.4cm/s. The frequency of its oscillation is
   [1 Marks]

   a) 4Hz

   b) 3Hz

   c) 2Hz

   d) 1Hz

3. A cylinder fixed at one end has a tangential force applied to its other end. The shape and volume of the cylinder remain unaltered. The strain produced in the cylinder is
   [1 Marks]
   a) Longitudinal

   b) Volumetric

   c) Shear

   d) Zero

4. The temperature of sun is measured with
   [1 Marks]

   a) Platinum thermometer

   b) Gas thermometer

   c) Pyrometer

   d) Vapour pressure thermometer

5. A closed vessel containing ideal gas is maintained at a certain temperature and pressure. If both temperature and pressure are doubled, then volume will be
[1 Marks]

a) Remains same

b) Double

c) Quadrupled

d) Halve

6. In the equation of progressive wave $y = Rsin(\omega t - kx)$ the maximum transverse speed of wave is
[1 Marks]

a) $\frac{\omega}{k}$

b) $\frac{d\omega}{dk}$

c) $R\omega$

d) k/ω

7. The phenomenon of interference is based on
[1 Marks]

a) Conservation of momentum

b) Conservation of energy

c) Conservation of momentum and energy

d) Quantum nature of light

8. A real object is 10cm in front of a concave mirror which produces an erect image. The radius of curvature of the mirror is
[1 Marks]

a) Less than 10cm

b) Exactly 10 cm

c) Between 10 cm and 20cm

d) More than 20cm

9. If I is the intensity of scattered light by medium then according to Rayleigh's law of scattering,
[1 Marks]

a) $I \propto \lambda^4$

b) $I \propto \frac{1}{\lambda^4}$

c) $I \propto \frac{1}{\lambda^3}$

d) $I \propto \frac{1}{\lambda^2}$

10. The space around a stationary charge has:
[1 Marks]

a) Electric field only

b) Magnetic field only

c) Localized electric as well as magnetic field

d) Electric and magnetic fields that are radiated

11. The capacity of a storage cell is 5Ahr. The maximum current that can be drawn through it for half an hour is
[1 Marks]

a) 2.5A

b) 10A

c) 15A

d) 20A

12. The susceptibility of paramagnetic substance
[1 Marks]

a) Does not vary with temperature

b) First decrease and then increase with increase in temperature

c) Increase with rise in temperature

d) Decreases with rise in temperature

13. A moving electric charge will produce
[1 Marks]

a) Electric as well as magnetic field

b) Magnetic field only

c) Electric field only

d) None of the two fields

14. A charge of mass m is projected perpendicularly in a magnetic field B, the angular velocity of charge is
[1 Marks]

a) $\frac{B}{m}$

b) $\frac{Bq}{m}$

c) $\frac{m}{Bq}$

d) $\frac{mq}{B}$

15. The energy of electron in hydrogen atom in its ground state is -13.6eV. The energy of electron corresponding to level n=5 is
[1 Marks]

a) -5.40eV

b) -0.85eV

c) -0.54eV

d) 5.4eV

16. In β −decay,
[1 Marks]

a) Atomic number increases by one and mass number remains same

b) Atomic number decreases by one and mass number decreases by one

c) Atomic number remains constant and mass number remains constant

d) Atomic number increases by one and mass number increases by one

17. A mass is thrown at 60^0 to the horizontal with speed of 10m/s. What % of total energy will be in the form of kinetic energy after 1s?
[2 Marks]
a)17%
b) 27%
c) 45%
d) 50%

18. If a body of mass m is to be projected vertically upward from surface of earth to reach height nR then increase in potential energy is
[2 Marks]
a) $\left\{\frac{2n}{n+1}\right\}mgR$
b) $\left\{\frac{n}{n+1}\right\}mgR$
c) $\left\{\frac{n}{2n+1}\right\}mgR$
d) $\left\{\frac{n}{n-1}\right\}mgR$

19. A spherical ball contracts in volume by 0.01% when subjected to normal uniform pressure of 100atmosphere. The bulk modulus of the material in Nm^{-2} is
[2 Marks]
a) 2×10^{10}
b) 2×10^{11}
c) 1×10^{10}
d) 1×10^{11}

20. The ratio of densities of two bodies is 3:4 and specific heat in the ratio 4:3. The ratio of their thermal capacities per unit volume is
[2 Marks]
a) 9:16
b) 16:9
c) 1:1
d) 3:2

21. A transverse wave described by $y = 0.02sin(x + 30t)$ propagates in stretched string of linear density 12g/m. The tension in the string is
[2 Marks]
a) 10.8N
b) 1.08N
c) 0.108N
d) 0.0108N

22. The distance between two coherent sources is 0.1mm. The fringe width on the screen 1.2m away from the source is 6mm. The wavelength of light used is
[2 Marks]
a) $4000A°$
b) $5000\ A°$
c) $6000\ A°$
d) $7200\ A°$

23. The relation between magnification m, image distance v, and focal length of a convex mirror is
[2 Marks]
a) $m = \frac{f}{v-f}$
b) $m = \frac{f-v}{f}$
c) $m = \frac{f}{v}$
d) $m = \frac{v}{f}$

24. The force between two plates of a parallel plate capacitor having a medium of dielectric constant K in the region between the plates of area A and having charge Q is
[2 Marks]
a) $\frac{Q^2}{2\varepsilon_0 AK}$
b) $\frac{Q^2}{2\varepsilon_0 A}$
c) $\frac{Q^2}{2\varepsilon_0 K}$
d) $\frac{KQ^2}{2\varepsilon_0 A}$

25. A wire of resistance R and length l is stretched to n times of its original length. The percentage change in resistance of wire is
[2 Marks]
a) $n^2 \times 100\%$
b) $\frac{1}{n^2} \times 100\%$
c) $(n^2 - 1) \times 100\%$
d) $\frac{1}{(n^2-1)} \times 100\%$

26. Two identical coils carry equal currents and have a common center, but their planes are perpendicular to each other. If the field due to one coil is B, then resultant field at their center is
[2 Marks]

a) Zero
b) $\frac{B}{\sqrt{2}}$
c) $\sqrt{2}\,B$
d) $2B$

27. The radius of orbital of electron in the hydrogen atom is $0.5A°$ and the speed of electron on the same orbit is 2×10^6m/s. Then current in the loop due to the motion of electron is
[2 Marks]

a) 1mA
b) 1.5mA
c) 2.5mA
d) 3mA

28. The radius of orbital of electron in the hydrogen atom is $0.5A°$ and the speed of electron on the same orbit is 2×10^6m/s. Then current in the loop due to the motion of electron is
[1 Marks]

a) 1mA
b) 1.5mA
c) 2.5mA
d) 3mA

29. Which of the following is not a verb?
[1 Marks]

a) Make
b) Carrot
c) Run
d) Grab

30. Choose the correct sentence.
[1 Marks]

a) The house is not enough big.
b) The house are not big enough.
c) The house are not enough big.
d) The house is not big enough.

31. Thankfully, we won't be ……. the mess after this concert is over.

[1 Marks]

a) Cleans up

b) Clean up

c) Cleaning up

d) Cleaned up

32. If you _____ my advice, you _____accept it.

[1 Marks]

a) Took - will

b) Take - will

c) Take – would

d) Takes – could

33. The indirect speech for "The customer said to the tailor, "Will you make the suit ready by tomorrow?" is:

[1 Marks]

a) The customer asked the tailor that he will have the suit ready by the next day.

b) The customer asked the tailor that he would have the suit ready by the next day.

c) The customer asked the tailor if he would make the suit ready by the next day.

d) The customer asked the tailor if he would make the suit ready by the next day?

34. Change the given sentence from assertive to exclamatory. "The sunrise is very beautiful."

[1 Marks]

a) The sunrise is awesome!

b) How beautiful the sunrise is!

c) The sun is absolutely beautiful!

d) The sunrise was good.

35.This is one of the matters that _____ me the most.

[1 Marks]

a) has disturb

b) are disturbing

c) disturbs

d) is disturbed

36. I am worried _____ the exam.

[1 Marks]

a) in

b) about

c) on

d) of

37. Honesty is the _____ policy.

[1 Marks]

a) Best

b) Worst

c) Better

d) Bad

38. What is the synonym for Admiration?

[1 Marks]

a) Respect

b) Effect

c) Avoidance

d) Addition

39. Which of the following contains the same vowel sound?

[1 Marks]

a) Kid-beat-tight

b) Deep-keep-sweep

c) Find-seat-kite

d) Feed-fine-mean

40. _____ words are the key to excellent pronunciation and understanding of English.
[1 Marks]
a) Stressed
b) Function
c) Unaccented
d) Non-stressed

41. 4.5 g of a metal on reaction with acid gives 5.6 liters of hydrogen gas at STP. The equivalent weight of metal is
[Option]
a) 7
b) 9
c) 12
d) 20

42. Which of the following set of quantum numbers is not possible?
[1 Marks]
a) n = 3, l = +2, m = 0, s = +1/2
b) n = 3, l = 0, m = 0, s = -1/2
c) n = 3, l = 0, m = -1, s = +1/2
d) n = 3, l = 1, m = 0, s = -1/2

43. H_3O^+ is acid according to the theories:
[1 Marks]
a) Arrhenius + Bronsted Lowery
b) Bronsted Lowery + Lewis
c) Arrhenius + Lewis
d) Arrhenius + Bronsted Lowery + Lewis

44. The oxidation number (O.N.) of carbon in $C_{12}H_{22}O_{11}$ is:
[1 Marks]
a) 0
b) -4
c) +2
d) +4

45. An element has the general configuration $(n-1)d^3ns^2$. The element is placed in the group.
[1 Marks]
a) II A
b) II B
c) VA
d) VB

46. Which of these is used to remove arsenic from SO_2 during manufacture of sulphuric acid?
[1 Marks]
a) $FeSO_4$
b) $Al(OH)_3$
c) $Fe(OH)_3$
d) $Fe_2(SO_4)_3$

47. Calgon can remove hardness of water
[1 Marks]
a) by precipitation
b) by complex formation
c) by ion – exchange
d) by oxidation

48. What is manufactured by the electrolysis of aqueous sodium chloride?
[1 Marks]
a) NaOH
b) NaClO
c) Na
d) $NaClO_3$

49. The number of secondary carbon atoms in 2, 3 – dimethyl butane is:
[1 Marks]
a) 0
b) 2
c) 3
d) 1

50. Which of these pairs represent functional group isomers?
[1 Marks]
a) ester and aldehyde
b) alcohol and ester
c) ester and ketone
d) ether and alcohol

51. The reaction, $C_6H_6 + CH_3CL \xrightarrow[\Delta]{FeCl_3} C_6H_5Cl + HCl$, is called
[1 Marks]
a) Wurtz's rxn
b) Fitting rxn
c) Friedel – Craft's rxn
d) Rosemund's rxn

52. What is the equivalent mass of H_3PO_3 in the reaction,

$2\ NaOH + H_3PO_3 \longrightarrow Na_2HPO_3 + 2\ H_2O$

[2 Marks]

a) 2M

b) M/1

c) M/2

d) M/3

53. 1.5 amphere current were passed through 500 ml of 0.2M $ZnSO_4$ solution for 10 minutes. The concentration of the solution after electrolysis is:

[2 Marks]

a) 0.18 M

b) 0.19 M

c) 0.15 M

d) 0.17 M

54. 0.5 g of NaOH is added to 100ml of 0.25N HCl solution. The pH of the resulting solution is

[2 Marks]

a) 0.3

b) 0.9

c) 1.3

d) 1.9

55. The Ksp of CaF_2 is 3.95×10^{-11}. The concentration of F^- ion in saturated solution of CaF_2 is:

[1 Marks]

a) 2.14×10^{-4} mols/litre

b) 6.28×10^{-6} mols/litre

c) 4.24×10^{-4} mols/litre

d) 1.25×10^{-5} mols/litre

56. An irritating gas which does not react with lead acetate but decolorize acidified $kMnO_4$ and turns acidic $K_2Cr_2O_7$ green, the gas is:

[2 Marks]

a) NH_3

b) H_2S

c) SO_2

d) PH_3

57. The conversion of FeO into Fe_2O_3 is compulsory in the extraction of iron. It is because
[2 Marks]
a) FeO is not easily reduced.
b) Fe_2O_3 is easily reduced.
c) Fe_2O_3 does not form slag with SiO_2 and prevents loss of Fe.
d) Fe_2O_3 is more reactive.

58. An alkene is obtained by heating an alcohol with conc. H_2SO_4. The alkene on ozonolysis results aldehyde as main product. The alcohol is :
[2 Marks]
a) ethanol
b) 2-butanol
c) 1-butanol
d) 2-propanol

59. The value of (126)1/3 up to three decimal places is
[1 Marks]
a) 5.011
b) 5.012
c) 5.013
d) 5.014

60. $4^{1+x} + 4^{1-x} = 10$ is called
[1 Marks]
a) reciprocal equation
b) exponential equation
c) radical equation
d) none of these

61. A square matrix A for which $AA = A'A$ is called a
[1 Marks]
a) column matrix
b) symmetric matrix
c) row matrix
d) skew-symmetric matrix

62. $\frac{8!}{7!} =$

[1 Marks]

a) 56

b) 7

c) 8

d) $\frac{8}{7}$

63. The general term of the sequence is denoted by

[1 Marks]

a) a_1

b) a_n

c) n

d) s_n

64. $\int \frac{\cos 2x}{(\sin x+\cos x)^2} dx$ is

[1 Marks]

a) $\frac{-1}{\sin x+\cos x}$

b) $\log(sinx + cosx) + c$

c) $\log(sinx - cosx) + c$

d) $\frac{1}{(\sin x+\cos x)^2} + c$

65. The area of the figure bounded by the curve $y = log_e x$, the x-axis and the straight line $x = e$ is

[1 Marks]

a) 5-e

b) 3+e

c) 1

d) None of these

66. If a function f is decreasing within $[a, b]$, then slope of tangent to its graph within $[a, b]$remains

[1 Marks]

a) Positive

b) Negative

c) Zero

d) Undefined

67. If $y = \cot^{-1} x$, then $\frac{dy}{dx} =$

[1 Marks]

a) $\frac{1}{1-x^2}$

b) $\frac{-1}{1+x^2}$

c) $\frac{1}{x^2-1}$

d) $\frac{1}{x^2+1}$

68. $\lim_{x\to 0} \frac{x}{x}$ is

[1 Marks]

a) 1

b) ∞

c) -1

d) nonexistent

69. The Centre and the radius of the circle is $x^2+y^2-4x-4y-8 = 0$ are

[1 Marks]

a) (2, 2), 4

b) (1, 2), 3

c) (-1, 3), 6

d) (2, 2), 8

70. The eccentricity of the parabola $x^2-4x-4y+1=0$ is

[1 Marks]

a) e>1

b) e=1/4

c) e=1/2

d) e=1

71. The angle between the pair of straight lines $2x^2+7xy+3y^2 = 0$ is

[1 Marks]

a) 60

b) 135

c) 75

d) 45 or 135

72. If the sum of the distance of a point from the origin and the line x=2 is 4 then the locus is

[1 Marks]

a) $y^2+12x=36$

b) $y^2-8x=24$

c) $x^2+y^2=49$

d) $x^2+6y=12$

73. The ratio in which the straight line joining (1,-2,3) and (4,2,-1) is divided by XY-plane is

[1 Marks]

a) 2:-3

b) 3:2

c) 4:1

d) 3:1

74. If S = {a, b, c} then the number of distinct relations on S is

[1 Marks]

a) 9

b) 2^9

c) 2^3

d) 9^2

75. Domain of tanx is

[1 Marks]

a) R

b) $R - \{x \mid x = n\pi, n \in Z$

c) $R - \left\{x \mid x = (2n+1)\frac{\pi}{2}, n \in Z\right\}$

d) none of these

76. Probability of getting an even number on dice is _____

[1 Marks]

a) 1

b) ½

c) 1/3

d) 0

77. The algebraic sum of the deviation of 20 observations measured from 30 is 2. So, the mean of observations is

[1 Marks]

a) 30.0

b) 30.1

c) 30.2

d) 30.3

78. If $\vec{a} = 3\vec{\imath} - 2\vec{j} + \vec{k}$, $\vec{b} = 6\vec{\imath} + 4\vec{j} - 2\vec{k}$ and $\vec{c} = 3\vec{\imath} - \overrightarrow{2j} - 4\vec{k}$ then [a b c]=

[1 Marks]

a) 120

b) 60

c) 80

d) 140

79. Roots of the equation $x^2 + 5x - 1 = 0$ are

[2 Marks]

a) rational

b) irrational

c) complex

d) none of these

80. The ratio in which the straight line joining (1,-2,3) and (4,2,-1) is divided by XY-plane is

[2 Marks]

a) 2:-3

b) 3:2

c) 4:1

d) 3:1

81. $(n+2)(\mathrm{n}+1)n$ in factorial form

[2 Marks]

a) $(n+2)\,!$

b) $\frac{(n+2)!}{(n-1)!}$

c) $\frac{(n+2)!}{n!}$

d) none of these

82. Arithmetic mean between $3\sqrt{5}$ and $5\sqrt{5}$ is

[2 Marks]

a) $8\sqrt{5}$

b) $2\sqrt{5}$

c) $\sqrt{5}$

d) $4\sqrt{5}$

83. $\int_0^{\frac{\pi}{8}} \cos^3 4x\, dx$ is

[2 Marks]

a) 5/3

b) 5/4

c) 1/3

d) 1/6

84. $\frac{d}{dx}(\cos\ x) - \frac{d^2}{dx^2}(\sin\ x) =$

[2 Marks]

a) $2\sin\ x$

b) $2\cos\ x$

c) 0

d) $-2\sin\ x$

85. The volume V of a cube as a function of the area A of its base.

[2 Marks]

a) $A^{\frac{5}{2}}$

b) $\sqrt{A}$

c) $A^{\frac{3}{2}}$

d) $2\sqrt{A}$

86. $\lim_{x\to 3} \frac{x-3}{x^2-2x-3}$ is

[2 Marks]

a) 1

b) $\frac{1}{4}$

c) ∞

d) none of these

87. The solution of the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ is

[2 Marks]

a) y = tan x

b) y – x = k(1 + xy)

c) x = tan y

d) tan (xy) = k

88. Maximum number of normal, which can be drawn from a point to a parabola is

[2 Marks]

a) 1

b) 2

c) 3

d) 4

89. The equation of the any line is x+3y = 6 . Then the points (-1,2) and (3,-2) lie on

[2 Marks]

a) Same side of the line

b) opposite side of the line

c) Equidistant from the line

d) The given line

90. A plane meet the coordinate axes at point A,B and C such that centroid of the triangle ABC is at (3,3,3) . Then the equation of the plane is

[2 Marks]

a) $x + y + z = 9$

b) 3x+3y+3z=1

c) $\frac{x}{3} + \frac{y}{3} + \frac{z}{3} = 1$

d) x+y+z = 1

91. Which of the following indicates the strongest relationship?

[2 Marks]

a) r = .5

b) r = .09

c) r = - .6

d) r2 = .2

92. Period of tan4x is
[2 Marks]

a) π

b) $\frac{\pi}{2}$

c) $\frac{\pi}{4}$

d) 2π

93. If $\vec{a} = 3\vec{\imath} + \vec{\jmath} - \vec{k}$ and $\vec{b} = \lambda\vec{\imath} - 4\vec{\jmath} + 4\vec{k}$ are parallel then the value of λ is
[2 Marks]

a) 4

b) 8

c) 12

d) -12

94. 9.6 gm of an acid was dissolved in 250 ml of solution. 25 ml of the acid solution required 32 ml of 0.5 N NaOH. The equivalent weight of acid is
[2 Marks]

a) 49

b) 60

c) 63

d) 90

95. Mercury is transported in metal containers made of
[2 Marks]

a) iron

b) silver

c) gold

d) lead

96. Read the following passage and answer the questions that follow:

The use of hot-air balloons can be traced back to the Three Kingdoms era of Chinese history (220-280 AD). Zhuge Liang used these early incarnations, known as Kongming lanterns, as military signals. The first manned flight on record took place in France on October 15th, 1783. In a balloon constructed by Jacques-Etienne Montgolfier, a Frenchman named Pilatre de Rozier was

elevated eighty feet off the ground. Modern hot-air balloons, with their capacity to ascend or descend and occasionally 'steer' at the pilot's will, were first developed by Ed Yost in the 1950s. The Bristol Belle is generally regarded as the first modern hot-air balloon and had its inaugural flight in 1967. Since then, balloon technology has become extremely sophisticated. Some hot-air balloons have reached altitudes of 21,000 metres, travelled over 7,500 kilometres, and reached speeds of up to 400 kilometres per hour.

97. According to the passage, In which era did the hot-air balloons come into use? [2 Marks]
a) Six dynasties (220-589 AD)
b) Three kingdoms era (220-280 AD)
c) Shang dynasty (1600-1046 BC)
d) Imperial China (221 BC – 1912 AD)

98. Who used the early incarnation of the hot-air balloons? [2 Marks]
a) Liu Bei
b) Cao Cao
c) Sima Yi
d) Zhuge Liang

99. When did the first manned hot air balloon come into use? [2 Marks]
a) October 15,1783
b) September 19, 1783
c) November 21, 1783
d) August 18, 1783

100. Who developed the Modern-Day Hot-air Balloons? [2 Marks]
a) Zhuge Liang
b) Pilatre de Rozier
c) Ed Yost
d) Joseph-Micheal Montgolfier